(Continued from page 1107)

Applied Numerical Analysis, C. F. Gerald, Addison-Wesley Publishing Co., Reading, Massachusetts. (1970). 340 pages.

The development of high-speed digital computers has greatly changed the techniques by which engineers solve many of the problems they encounter in research, development, and design. It has become essential for engineering and science students to become familiar with the numerical methods needed in computer programs for solving large systems of linear equations, numerical integration of differential equations, and finding roots of equations, just to name a few. Although several textbooks covering numerical methods have been published in recent years, this new book will be of interest to many teachers because of the author's individual approach to the subject.

The author has designed the text for undergraduate students in mathematics, engineering, and science at the sophomore or junior level. A knowledge of calculus is assumed, and an introductory course in differential equations is probably needed if the chapters on that material are to be included in a course. Error analysis of the numerical methods is covered but is, of necessity, somewhat restricted because of the level of the text.

Emphasis throughout the book is on applications of numerical procedures, with many of the examples chosen from real physical situations. Each chapter begins with a discussion of numerical methods; this is followed by a discussion of the programming considerations for those methods.

There is enough material in the text for a full year's course. The topics include roots of equations, interpolation, numerical integration and differentiation, ordinary and partial differential equations, systems of linear equations, and curve fitting. The coverage of recent literature includes Romberg integration and a brief introduction to the use of cubic splines for curve fitting. The text is replete with examples, sample programs in FORTRAN, and problems for homework assignment. Many of the problems have answers given, which will be of help to students.

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Describing Chemical Engineering Systems, William E. Ranz, McGraw-Hill, (1970). 248 + xx pages. $9.95.

Often the most effective learning is accomplished by putting oneself actively into problem solving situations and by using new information in a purposeful way. Most college-level texts concentrate upon an orderly, expository presentation of subject matter, without emphasizing problem material. Professor Ranz has prepared a participation workbook in which much less than half the book is devoted to text material, and the main bill of fare is a large number of short problems which endeavor to develop the text material as the student uses it in the problems. Each set of problems dealing with a given area is followed by an answer-discussion section which gives solutions and stresses important points contained in the solutions.

The subject matter is basically that of a first chemical engineering course: energy and mass balances, stoichiometry, mathematical analysis of simple systems, elementary phase equilibrium, and simple and multistage separations. The author indicates that the book is suited for self-study or for use with a teacher. Because of the quite skimpy presentation of the textual material itself, it would be difficult to use the book as the sole text in an introductory course. Perhaps the best and most effective use would be as an intensive review by someone who had at some time in the past already taken a stoichiometry course. The book should be ex-

(Continued on page 1118)

(Continued from page 1116)

INFORMATION RETRIEVAL

(Continued from page 1110)

Radiation-10, Light-9, Intensity-6, Concentration-6, Removal-4, Pollutants-9, Water-5, Carbon Dioxide-2, Carbon Monoxide-2.

Abstract: The photodecomposition of aqueous solutions of formic acid was studied as a model reaction for removing organic pollutants from water. The process was carried out in a tubular-flow reactor, operated continuously. The cylindrical reactor was irradiated from the outside by placing the cylindrical lamp and the reactor at the foci of an elliptical reflector. Measurements made at differential operating conditions permitted calculation of rates of reaction as a function of formic acid concentration and light intensity. Carbon dioxide and carbon monoxide were the only observed products of the decomposition.

Drop size distributions produced by turbulent pipe flow of immiscible liquids, Collins, S. B., and J. G. Knudsen, **AIChE Journal, 16,** No. 6, p. 1072 (November, 1970).

Key Words: A. Distribution-7, 8, Size-7, 8, 9, Drops-9, Flow-9, Turbulent-0, Pipe-9, Liquids-9, Immiscible-0, Turbulence-6, Velocity-6, Breakup-7, Mathematical Model-10, Stochastic Model-10.

Abstract: Drop size distributions in turbulently flowing dispersion of immiscible liquids were investigated. The observed drop size distributions were actually a composite of two superimposed distributions. One is the distribution produced by the injection nozzle and the other is that produced by breakup in the turbulent flow field. A mathematical model was developed which predicted both the shape of the observed distributions and kinetics of the droplet breakup process for the distribution produced by the turbulent flow field.

Feedback control of an enriching column, Shoneman, Keith, and Jack A. Gerster, **AIChE Journal, 16,** No. 6, p. 1080 (November, 1970).

Key Words: A. Control-8, Distillation Column-9, Enriching-4, Feedback Control-8, Closed Loop-0, Ziegler-Nichols Method-10.

Abstract: The transient behavior of a 24-in. diam., 10-tray enriching column was investigated experimentally while the column was operated under closed-loop, feedback control. This behavior was compared with that of a perturbated linear model with the column open-loop behavior being represented with simple transfer functions in the frequency domain. Comparisons showed that control parameters determined using the predictive linear model were conservative and permitted stable and smooth responses of the experimental column.

Free tear sheets of the information retrieval entries in this issue may be obtained by writing to the New York Office.

(Continued from page 1117)

cellent preparation for someone studying for a comprehensive examination; it would also make a good starting point for an engineer embarking on a continuing education program after having been away from studies for some years.

The problems are for the most part very well chosen; many are qualitative, and none involve extensive computations. It does seem, however, that the author could have taken some advantage of the opportunity to put an engineering flavor onto many of his problems, rather than staying in the realm of basic scientific analysis as he has done. Questions of the type, "Devise a process which will . . . ." could have been quite effective illustrations and discussion vehicles.

Learning through direct involvement in problems can be highly beneficial, and this book should be a valuable experience for anyone who uses it in the intended way. It is easy to take the short way out, however, and anyone who proceeds on to the answers without reasoning the problems out for himself will lose much of the value of the book. The pages are all perforated, but this does not make the answers any less available, nor does there seem to be any reason to remove the pages after one has completed them. The book has a good nomenclature section, but no index; this hampers the reader in referring back to previous textural material.

Professor Ranz's book has much to offer to anyone who will give it the thought and time which it demands.

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